ABSTRACT

AN INTEGRATED SYSTEM APPROACH TO STATISTICAL REPORTING - CANADIAN AIR TRANSPORT SECTOR*

G. Baldwin and E. Di Sanza

This paper briefly traces significant developments in the evolution of statistical collection in the air transport sector, delineates the current environment, and examines the prospects for an integrated statistical framework. The analytical parameters of the paper encompass the information flows and linkages among the key participants in the collection and use of statistical data.

The paper concludes that while there will be a sustained requirement for air transport data in a deregulated environment, it is highly probable that the regulatory basis for the collection of data will be significantly reduced. Programs for data acquisition will have to be formulated in terms of use and value to the producers of transportation services and with a view to increasing productivity.

* paper submitted for presentation at the "Fourth World Conference on Transport Research", Vancouver, B.C. - May 11-15, 1986.

AN INTEGRATED SYSTEM APPROACH TO STATISTICAL REPORTING - CANADIAN AIR TRANSPORT SECTOR

G. Baldwin and E. Di Sanza*

For more than fifty years, the statistical information supplied by air carriers has been critical to the regulatory and planning process of the air transport sector in Canada. Yet, the collection of statistics has almost been taken for granted in these decision-making processes. In the last decade, however, the air transport sector has been influenced by two factors, in particular, which have put the collection of data in a new light. The first of these concerns rapid advances in data processing techniques and the second relates to the deregulation of air transport.

In the first case, technological progress has broadened the scope for direct user interaction with databases and has resulted in increasingly sophisticated applications and a greater demand for data.(1) In the second, developments associated with deregulation in both Canada and the United States have served to undermine the regulatory basis for the collection of operational, financial, and traffic data. The result has been a protracted and unresolved debate on the need for data collection.(2) In the United States, the movement toward deregulation began in the late 1970s and reached a major milestone with the dismantling of the Civil Aeronautics Board in 1984. In Canada, the first concrete steps towards regulatory reform in air transport were initiated by a new policy statement in May 1984; these were followed by more far reaching proposals, contained in a "white paper" released by the federal government in July 1985, for changes to the National Transportation Act.(3)

Purpose

This paper briefly traces significant developments in the evolution of statistical collection in the Canadian air transport sector, delineates the current environment with respect to data collection, and examines the prospects for an integrated statistical framework in the air transport sector. The analytical parameters of the paper encompass the information flows and linkages among the key participants in the collection and use of statistical data: air carriers, government policy and planning bodies, and private/para-public organizations servicing the air transport sector.

---

* The authors are members of the staff of the Aviation Statistics Centre, Transportation Division of Statistics Canada. G. Baldwin is Head, Airports and Civil Aviation Unit; E. Di Sanza is Senior Statistician, Fare Analysis. The views and opinions expressed in this paper are those of the authors and do not necessarily reflect those of Statistics Canada.

Although it is outside the terms of reference of this paper to assess the relative merits or shortcomings of deregulation, the issue of data collection in Canada cannot be legitimately addressed without considering the potential impact of deregulation on reporting requirements for the air carriers and the attendant implications for the administrative framework of data collection (including prospects for alternative structures). While this paper focuses on the Canadian air transport industry, it also draws on the American experience.

The interest in the U.S. experience extends beyond the academic practice of reviewing the relevant literature. Rather, it is dictated by the fact that North American air transport is closely integrated (not on a corporate level, owing largely to the tightly regulated ownership of the airline industry in both Canada and the United States, but at a technological and operational level) and that the outcome in the United States is bound to have significant ramifications for data collection in Canada, and indeed, throughout the world.(4)

An example of this integration of Canadian and U.S. systems is provided in the Canada-United States bilateral agreement. As part of the agreement, there exists a bilateral exchange of origin and destination data for major scheduled services between Canada and the United States. This exchange is based on a sample of lifted flight coupons from major scheduled service air carriers. Changes in the level of detail reported by U.S. carriers to the U.S. government (or in the requirement that the information be filed at all) could impact on this exchange agreement. With over seven million passengers flying annually on scheduled services between the two countries, the data gap from any discontinuance of the exchange would be a large one.

Another example of this interdependance is the close operational relationship between Canadian carriers and U.S.-based firms which provide information on air services (such as the Official Airline Guide Inc. and the Airline Tariff Publishing Co.).(5) These firms are used by major Canadian and U.S. scheduled carriers for the dissemination of schedule and fare information, including compliance with certain tariff filing regulations. Widespread industry interaction with these organizations has resulted in highly comprehensive data banks containing standardized information on schedules, fares, routings, frequencies and capacity.

Statistical Collection in The Air Transport Sector in Canada

While some operational and financial data were collected as early as 1936, the evolution and changing composition of the air transport industry in Canada, especially during the 1960s and 1970s, concomitant with advances in computer data processing capability, resulted in changes in data collection requirements and techniques.(6) In 1962, it was recognized that "... modern data processing made it possible to design statistical systems based on standardized source documents capable of providing a wide range of specialized information to satisfy the growing needs of operations research and economic analysis".(7) The following developments underscore this relationship between technology and demand.

The early sixties marked the development of various statistical systems to provide information on traffic flow, demand for air services, and aircraft movements, based upon the "extensive application of modern data processing methods".(8) This enabled the massaging of large volumes of data and the production of a variety of tabulations.

As the air transport sector changed, surveys were modified and additional ones established to meet new information requirements. This is typified by the emergence of charter services (initially international and later domestic) as a significant market alternative to scheduled services in the seventies.(9) As the importance of this component of the industry grew, a charter survey was initiated to meet the growing data requirements for regulatory and planning purposes.

Emanating partly from the competition of charters and the deregulated environment in the United States, Canadian airlines, by the late seventies, were offering a proliferation of discount fares. Initially, (i.e., for the period 1978-1982) government monitoring requirements in respect of discount fares were met through special filings from selected carriers. By 1983, in the face of identified limitations in the special filings approach (e.g., lack of uniformity in concepts and discontinuous time series) regular reporting procedures were established, in consultation with the airline industry, to meet ongoing monitoring needs.(10)

While new surveys have been used to address the requirement for further information, there has been a continuous process of evaluation of the information collected.

As early as 1952, the need to periodically question the relevance of collected data and to be cognizant of response burden was manifested by Canadian regulatory authorities, as illustrated in the following excerpt:

> "It is considered that these reduced requirements will provide the Board with the minimum information required for performance of its duties and if all carriers report properly it should be unnecessary to require additional reporting forms."(11)

By 1963, however, prospects for reduced reporting were tempered by the increasing complexity of the industry and the need to maintain continuous time series.

> "The reporting procedures ... follow the main lines of the reporting system which existed to date, thus preserving the general continuity of the system. With a few exceptions necessitated by the increasing complexity of the industry's operations, the changes now introduced should result in a decrease of the reporting burden, especially as far as the smaller groups of carriers are concerned."(12)

As a result of zero-base reviews, there were extensive revisions to the reporting forms used by air carriers operating in Canada in 1970 and again in 1981. These reviews entail a detailed examination of reporting forms and

respective data elements whereby specific items continue to be collected only if their use can be justified. This exercise ensures that the collection process involves usable and relevant information only.

In parallel with changes in the type of data collected, there has been a rapid evolution in the technology of data processing. The application of modern processing techniques allowed the handling of very large volumes of data and increased the prospects for reducing response burden by making feasible the automated assignment of parametric information.(13) At the same time, the increasing level of computerization among carriers (in load reporting, passenger reservations, accounting systems, etc.) permitted the filing of computer generated-data. In the past, judging by the method of reporting, this approach was cost-effective only for major carriers; computerized reporting among smaller carriers was negligible. More recently, the need for greater efficiency (under deregulation), the development of powerful mini/microcomputer systems and the greater availability of lower cost software has begun to drawn the smaller carriers into the computerized framework.

In addition to time and cost benefits for both suppliers and receipients, computerization also has an impact on data quality. If the information is a by-product of the carrier's own information system (i.e., already captured for the carrier's internal use), it is probable that the quality of the information is superior to that of a report generated only for government reporting purposes. It has been argued that "there is a risk of quality deterioration when a carrier is asked by government to report information in a specific format which is not relevant to carrier's on-going management information system."(14)

Structure

While the move to deregulation may have focused attention on the need to rationalize the basis for collecting transport data, the importance of data on various transport sectors was recognized more than twenty years ago in Canada by a federally appointed commission on transportation; the commission produced a report which dealt with the different facets of transportation statistics in Canada.(15) Aware of the "economic dangers and costs of irrational development of systems", the government undertook to develop, through the central statistical agency, a mechanism for analyzing and managing transportation systems.(16)

With respect to air transport, this led to the creation in 1966 of the Aviation Statistics Centre (ASC) to coordinate the collection, processing and disseminating of air statistics in Canada. Within one identifiable structure, ASC grouped statistical functions and resources previously dispersed among three government bodies: operational and financial data relevant to the national accounts had been collected by a unit of the Dominion Bureau of Statistics (now Statistics Canada); aircraft movement and runway utilization statistics as well as traffic and market data had been reported to the Department of Transport, while the Air Transport Board, responsible for the economic regulation of the industry, had handled the data on level of service, route structure, and carrier income.

From the respondents' point of view, this new structure reduced the possibility of duplicate surveys on air transport operations and provided a single focal point for statistical filing. ASC was mandated with the dissemination of internal data to various user groups within the federal government as well as the production of summary reports available to the public.

Current Enviroment

Within the current framework of deregulation of the Canadian air transport sector, and as was the case in the United States in the early 1980s, the issue of data collection is at a crossroads. One school of thought argues that the continued collection of data is consistent with deregulation and crucial to the new competitive order; the other maintains that the "industry should not be required to supply more data than any other non-regulated industry " and that the continued reporting of the type of data currently supplied would be "anti-competitive".(17)

In a regulated environment, databases on air carrier operations were established primarily in support of federal regulatory and planning requirements. In the deregulated environment facing the U.S. industry in the early 1980s it became apparent that the need for collecting data would have to be substantiated under different criteria - the value of the data to the air industry became a primary concern. Also acknowledged was the real possibility of "increasing reluctance on the part of the carriers to continue disclosing ... commercially sensitive information in a deregulated environment".(18)

However, in the debate on the need for data in a deregulated environment, it was demonstrated that the major databases containing operational, financial and traffic statistics would continue to be of considerable use and value to both the public and private sector. For government, there will be a continued requirement to plan and maintain the air transport infrastructure,monitor bilateral agreements, meet multilateral statistical obligations, and ensure the safety of the civil air transportation system.

For carriers, the data were "integral to planning and measurement" of performance; furthermore, in a competitive environment there would be a greater need for more frequent and timely forecasts given that parameters and assumptions relating to route structure, yield and level of competition would no longer be as predictable as in the previously regulated environment.(19) Proponents of the continuance of data collection programs identified, as prerequisites for the production of accurate statistics, the following elements:

(1) compulsory reporting;
(2) centralized collection; and
(3) uniform definitions.

These conditions did not, though, rule out the privatization of data collection and dissemination which in itself raises "the complex problem of cost recovery".(20) Cost recovery, however, is not the only problem in considering the privitization of the data collection process. Confidentiality of the data is a major concern to the participants.

In a deregulated environment, information on individual markets, routes and carriers become even more sensitive as competitors will have more ability to take advantage of discernable opportunities. Reporting of the data to an agency with statutory restrictions on the level of detail that may be released to the public may be a prerequisite to the continuation of accurate and timely reporting.(21)

Prospects for an Integrated Statistical Reporting Framework in Air Transportation - Directions for Collection in the 1980s and 1990s

On the premise that there will continue to be a requirement for information on the air transport sector, what data collection methods would be best suited to meet these requirements in the 1980s and 1990s? What structure could provide this at least cost and with minimum response burden? In response to these questions, the following section examines the nature of the interaction between key participants in the collection and utilization of statistics on the air transport industry; basic information flows and linkages are schematically represented in the accompanying diagram.

Air Carriers and Private Information Services

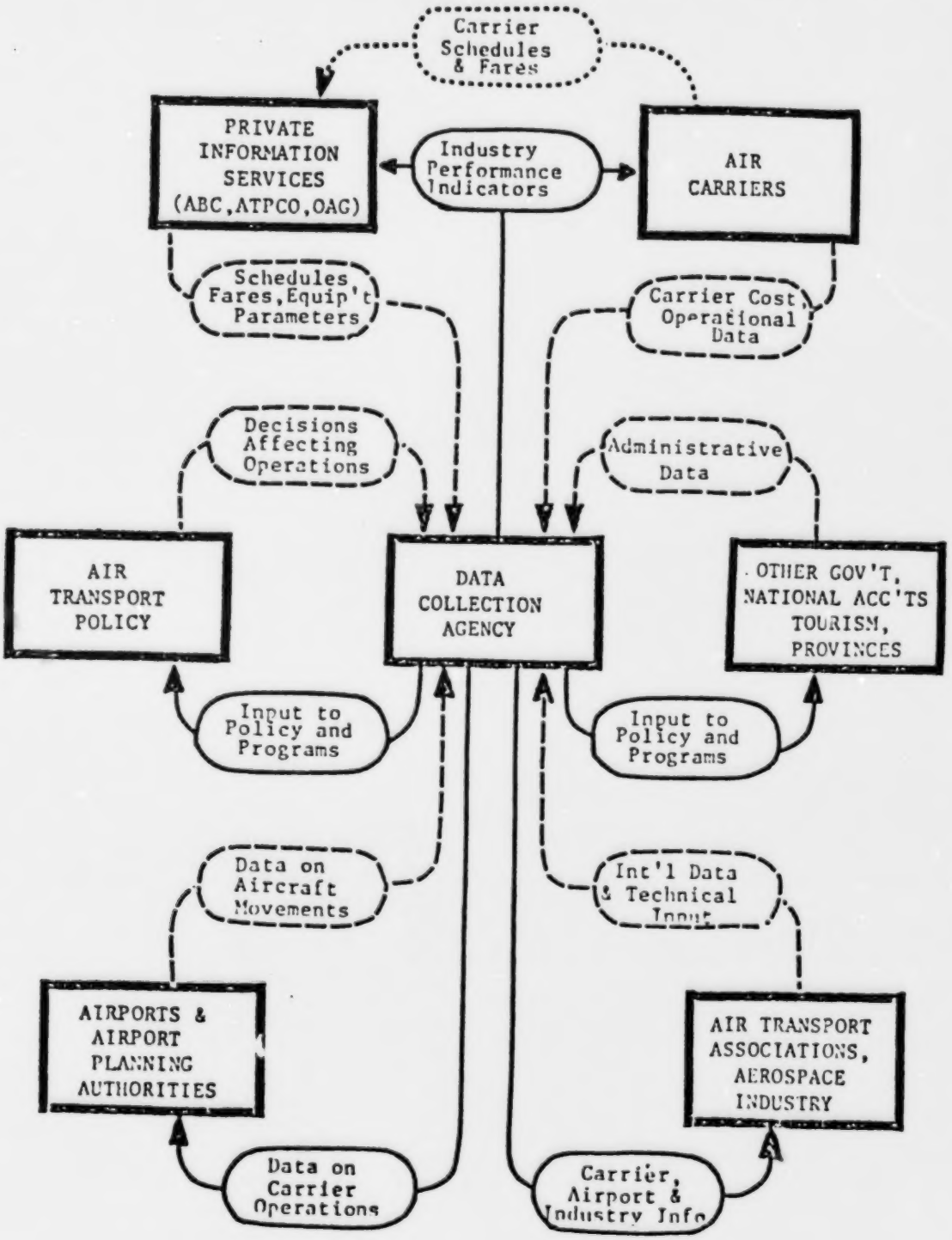
A key interaction lies between the data collection agency and the air carriers. The air carriers are the only ones to have basic information on the operations that are required by all the other groups. This will mean that direct surveying of the air carriers will continue to be the preferred method of obtaining key information. The use of one agency will enable the air carriers to file this information once only rather than having to file the same or similar information to several groups.

The information flow is not strictly from the air carriers to the data collection agency. Indicators of the industry's financial and operational health (e.g., yield, equity/debt ratio, load factor) or of a carrier's relative performance, as well as information in support of marketing, scheduling and route planning, will flow back to the respondent air carriers.

Not all carrier-specific information will need to be obtained directly from the air carriers. Increasingly, it is possible to use information that the carriers have already supplied to other groups. This could involve third parties that provide services to the industry such as those which publish schedule, tariff or other operational information. A case in point lies in the acquisition, by ASC from Official Airline Guide Inc., of certain data on flight schedules to complement carrier reporting on the traffic flow survey. Through such a contractural arrangement, air carriers have been relieved of having to report this information on close to a million records filed annually.

It is suggested that it could be advantageous for both the air carriers and private information services to become more involved in the front-end tasks of data collection in the future. While the air carriers have always been consulted to some degree in the formulation of reporting requirements, potential benefits exist in their greater involvement in survey design. This would help to ensure that what is requested is operationally feasible and can be produced at a reasonable cost. The carriers' interest in the data output

DIAGRAM 1. STATISTICAL FRAMEWORK - AIR TRANSPORT SECTOR INFORMATION FLOWS AND LINKAGES



Key participants in statistical process.

Input to data collection agency.

Output from data collection agency.

Other data flows.

may also be heightened by the increased requirement for marketing information that the movement towards deregulation will bring.(22) The private information services are in a position to offer expertise in the areas of data transfer and transmission to minimize the costs of data capture.

Government Departments, Industry Organizations

Data filed with one group may be used to supply multiple users. This is shown in Diagram 1 as the data flow between the data collection agency and other government departments, air transport associations and international organizations. Data produced by ASC are used to derive the estimates of gross national product, provincial accounts, input-output tabulations, and to verify or benchmark other data on wages and salaries, travel and tourism. The same data tabulated differently by the ASC are used to meet the filing requirements of Canadian air carriers with the International Civil Aviation Organization (ICAO). The burden of reporting similar data in different formats to many users is transferred from the air carriers to the central collection agency. One advantage to user groups of this process is that the definitions used in the various tabulations can be more homogeneous when they are generated by one group.

The data collection agency can also utilize information already supplied to other government departments. An available source of data are the tax records filed by air carriers. Use of these data, could provide a source of financial information without directly surveying the individual firms. However this approach has merit principally with respect to smaller firms, since a major disadvantage of using the tax data is that the information is disaggregated for tax purposes and not for the analysis of air transport operations. Revenue information is not available by type of service (unit toll, charter, specialty) or by passenger or cargo operations. Recognizing the inherent limitations in using taxation data for operational analysis, there is, nevertheless, utility in the use of tax data as an indicator of financial health and performance, especially with respect to the smaller air carriers.

Airports

Another two-way flow exists between the data collection agency and the airports and/or airport planning authorities. There often are administrative data that can be readily collected, in the process of normal air traffic control operations, which can yield a large amount of information about the air industry in general or about specific carrier operations. This information can be supplied to the data collection agency to supplement the information collected by directly surveying the industry.

A good example of this type of operation in Canada is the use of air traffic control tower records. Major scheduled service air carriers were required to file data on actual times of flight arrivals and departures to the air regulatory body in the late seventies and early eighties. The filing was made optional with the data being derived from the air traffic control tower records that were already collected for such purposes as work load measurements and noise contour studies. This reduced the amount of information that the air carriers were required to tabulate and file without reducing the information available to those using the survey data.

In return, the data collection agency can supply the airports and airport planning authorities with additional information on carriers and aircraft operations at individual airports. Information obtained from the carrier surveys (e.g., passenger and cargo traffic flows) are necessary for planning of airport operations and infrastructure.

There have been suggestions that the operation of the major airports in Canada be turned over to local and/or private groups rather than having their operations run by the federal department of transport(23). There remains, even if this should occur, good reasons to have a centralized and uniform data collection procedure for airport data. Collection, processing and dissemination by one group will help to ensure that the respective airports can make meaningful comparisons of their activity with other aiports within the country. Where the data of interest to the airport authority is carrier (rather than tower) generated, the carriers would benefit if the information could be produced as a by-product of data already filed with another group (the data collection agency) rather than their having to create different tabulations and reports for each airport served.

Air Transport Policy

The air transport policy body is included as one of the participants in Diagram 1. Even with the move to increased deregulation, some monitoring and control will likely remain in the international air markets and possibly as well in select domestic markets (particularily those which may require subsidized services). There also will be a requirement to measure and monitor the changes that the move to deregulation have brought into the air transport sector. To perform all these functions, data on the air carriers' operations will be required. This is shown in the diagram as coming from the data collection agency. There is a return flow to the agency from the air transport policy body in the form of policy decisions that would affect the survey universe, concepts or information to be collected.

The central data collection agency must continue to monitor and review the data elements that are collected to ensure that they remain relevant and useful. At the same time, any changes introduced must be well planned. While benefits of the use of automated data generation and storage have already been discussed, there are costs associated with changes in data reporting requirements.(24)

Changes in reporting requirements can mear new procedures, training and system changes. When asked to comment on two alternative methods of statistical data collection proposed by ICAO, the reply from Japanese authorities was as follows:

> "most of the output of our traffic data including ICAO statistics have been computerized. Therefore, it is considerably difficult for us to change the method of collecting data. In this sense, it does not matter much whether the Alternative A or B be adopted; what we are concerned is that once a new method is established, such method should not be changed frequently".(25)

The problem of the cost of introducing changes to automated systems could be even greater in the 1980's and 1990's as the use of computers in operations and data filing becomes more prevalent with smaller carriers. While the software available will increase the carriers' flexibility in reporting formats, any content changes in the information to be reported (i.e., requiring completely new data items) could still mean expensive changes in the carriers' internal information gathering and processing operations.

In the past, the argument has been made that outputs from the carriers' internal reporting systems were not compatible with the analytical requirements of the regulatory agency.(26) It is likely, however that in a deregulated environment, the analytical focus of public bodies will be more compatible with that of the air carrier.

The possibility also exists for a more flexible approach, on the part of the data collection agency, with respect to the formatting of the data to be filed. This involves the use of "model" or "standard" reporting formats for use in the direct surveying of the carriers in the air transport sector.(27) These formats will indicate the mandatory data items, level of detail and aggregation to be used in reporting. Respondents to the survey must supply information to at least the detail required in the model format.

Carriers will have the option to file data at a more disaggregated level, closer to that of their own internal reports. The onus will be on the central collection agency to tabulate the individual submissions into data where inter-carrier comparisons are possible. This increased flexibility in the data submission formats is possible due to the increased use of computer filings by the carriers. Use of the carriers' data in formats that are closer to their own internal reports will eliminate some of the cost and reporting burden on the respondents. It also has the advantage of leaving the discretionary decisions on how items should be handled to one group. This increases the chance of uniform treatment and consistent conceptual definitions in the final data produced.

Not all carriers will opt for this new freedom in data filing. It is expected that some will continue to aggregate their data to the highest level allowed if their internal data were to reveal information that they would prefer not to release to outside groups. The success of this kind of flexible filing formats, as opposed to rigid standardized forms, is contigent upon a centralized data collection agency to ensure that concepts and definitions are compatible amongst the surveys and the respondent air carriers.

This examination of the information linkages suggests that the use of a centralized data collection agency to collect, co-ordinate, process and disseminate the information on the industry appears to be an efficient solution for the 1980s and 1990s.

Conclusion

The U.S. experience points to a sustained requirement for air transport data in a deregulated environment and indicates that the needs will emanate from both the **private** and **public** sector.

In Canada, as in the United States, the air transport industry will operate within an infrastructure (which may be wholly or partly publicly-financed) and for which legitimate planning and policy decisions will require appropriate statistical input. Similarly, the airline and aerospace industries will continue to make long-range, high-risk decisions, supported by sophisticated analytical models. Analysts from the private and public spheres have perceived the need for more frequent and timely forecasts to compensate for rapidly changing conditions.

Despite the continued need by private and public users, it is highly probable that the regulatory basis for the collection of data will be significantly reduced. Programs for data acquisition (whether retention of current programs or the introduction of new ones) will have to be formulated in terms of use and value to the producers (defined broadly) of transportation services and with a view to increasing productivity.

Drawing on the U.S. experience, there appears to be a general recognition that if data collection programs are to be retained or established, it cannot be on a voluntary basis; centralized collection is essential to ensure conceptual consistency. Within this framework, there will have to be more explicit recognition of the cost factor in the provision, processing and dissemination of data.

A comprehensive statistical reporting system, integrating the requirements of the national accounts system with the operational needs of the transport sector is a prerequisite to minimizing response burden and duplication. At the same time, a centralized structure appears to be necessary in order to take advantage of economies of scale and scope so as to minimize processing costs.

Some analysts of the data collection question in the United States have suggested that complete takeover by private interests is a viable alternative to current government involvement. From a Canadian perspective, the existence of a central statistical agency tasked to maintain national accounts, coupled with greater emphasis on intermodal analysis, and concerns over data confidentiality, tend to preclude the viability of a private operation.

In an environment where most applications of transportation data systems will be of a non-regulatory nature, the private sector (specifically the air transport industry) will assume a greater role as user of data. Greater attention must be paid to costs of providing data (both direct reporting costs and as well as the potential cost to a carrier's competitive position through the disclosure of sensitive market data) with a view to (i) streamlining reporting requirements to be compatible with internal accounting systems, and (ii) establishing efficient data transmission techniques for collection and dissemination.

Following a pattern where federal data collection activities have evolved in concert with provincial and local requirements(28), the "information relationship" of the 1990s will likely prescribe a greater responsiblity to the air carrier industry in the design and mechanics of data collection. A direct role for this component of the private sector is a logical extension of the zero base reviews of the past as an effective mechanism for responding to changing conditions and requirements in the sector.

References:

1. See discussion on trends in information needs in Rolf R. Schmitt and Alan E. Pisarski "Diverging Information Needs and Resources in Transportation Research" in Proceedings of the 24th Annual Meeting, Transportation Research Forum, vol. xxiv, No. 1 (1983) pp. 438-443.

2. In the United States, the Transportation Research Board Committee on Air Transport Operations and Maintenance held a number of conferences on the subject during 1980 and 1981. See, for example, Transportation Research Circular no. 239 "Uses and Misuses of Airline Traffic, Financial and Cost Data" (January 1982). See also Proceedings of the International Aviation Data Symposium held March 3-5, 1980 at the Transportation Systems Centre, Cambridge Mass. (Office of Air Transportation of U.S. Dept of Transportation in conjunction with Flight Transportation Laboratory, M.I.T.). In 1985, it was noted that the issue of data collection is still under review, see Lloyd's Aviation Economist (February 1985, p. 24).

3. Whereas the policy statement issued in May 1984 dealt solely with the air transport sector, the document released in July 1985 (Freedom to Move - a framework for transportation reform, Transport Canada TP-6678) takes a multi-modal perspective. The latter was the subject of public hearings held by the House of Commons Subcomittee on Tranportation in the fall and winter of 1985.

4. Lloyds Aviation Economist (February 1985, p. 24) reported that "it is often non-U.S. organizations which find CAB data most useful" particularily in countries where a "dominant national carrier opposes data publication".

5. Although there is a strong operational link between Canadian carriers and these U.S. firms, overseas firms also provide information on the operations of Canadian carriers (see, for example, ABC World Airways Guide).

6. Canadian commercial carriers performed 4.6 billion passenger-kilometres in 1960; by 1970 figure was 18.6 billion and in 1980 it had risen to 47.0 billion.

7. K.W. Studnicki - Gizbert, Methodology of Transport Statistics, introduction. York University, Transport Centre Reprint No. 1 (April 1970).

8. Studnicki - Gizbert p 15.

9. Charter activity, as measured by passenger-kilometres flown by Canadian air carriers, increased fourfold between 1954 (the first year that basic charter data were collected) and 1970, when a new survey on charter operations by origin and destination was established.

10. For the domestic operations of scheduled Canadian carriers and measured in terms of passenger-kilometres, deep discount traffic as a percentage of total traffic rose from about 15% in 1978 to approximately 53% in 1984. See J.A. Greig, E. Di Sanza "The Fare Basis Survey and Discount

Air Fare Utilization in the Domestic Market" in Air Transport Monitor Vol. 1 No. 4, Canadian Transport Commission (CTC) Research Branch. See also CTC, The Low-Priced Air Fare Review: The First Five Years (Ottawa, November 1983).

11. Air Transport Board, (Ottawa, Canada) circular no. 15/52.

12. Air Transport Board, Circular No. 22/63

13. The use and assignment of parameters (e.g., aircraft operating specifications) increases the scope for verification of reported data, facilitates the classification and grouping of data for tabulation and helps to standardize outputs and retrievals among different surveys.

14. John Heads, "Transport Statistics: Sources and Limitations" in Proceedings of the Seminar Series on Transportation v. 13 (1979/80) Centre for Transportation Studies, University of Manitoba.

15. D. Eldon, "Review of Federal Transportation Statistics", Report of the Royal Commission on Transportation (Ottawa 1961).

16. Quebec Ministry of Transport, J. Galarneau and R. Hamelin "The Development of a system of Transportation Statistics at the Quebec Ministry of Transport", August 1979.

17. See J. Sauter, "Airline Data Reporting Requirements Cost & Benefits for Large Carriers and Aircraft Manufacturers", in Transportation Journal Winter 1982, Vol. 22, No. 2, pp. 74-83.

18. Clifford M. Rand, "Status of CAB Data Requirements Plans" in Transportation Research Circular No. 239 (January 1982) p. 41.

19. See Robert E. Dunn, "Deregulation and Forecasting: Uses and Misuses of Data" in Transportation Research Circular No. 239 (January 1982) p. 30-31.

20. This question is discussed in Sauter pp. 78-80 and raised in Lloyd's Aviation Economist (February 1985, p. 24).

21. In 1979, Canadian commercial air carriers were surveyed concerning the confidentiality of the data that they filed for regulatory purposes. This resulted in the regulatory body designating individual carrier data as confidential. Air Transport Committee, Canadian Transport Commission, Notice Respecting Information Designated to be Confidential, January 10, 1984.

22. Deregulation may heighten conflicting tendencies within air carrier management. They desire more detailed and timely information on their competitors operations and wish to release less detailed information on their own operations. Mandatory filing by all carriers to a non-commercial data collection agency may help to minimize the conflict. This will help ensure uniform requirements for filing and uniform rules for data access.

23. Freedom to Move, p. 22.

24. See "IATA Data Collection Activities" in Proceedings International Aviation Data Symposium (1980) Appendix A.

25. ICAO Working Paper AT-WP/1247, April 7, 1977, p. 17.

26. See Geoffrey D. Gosling, "Analysis of Airline Station Cost Data" in Transportation Research Circular No. 239 (January 1982) pp. 8-9

27. The use of one standard form with no flexibility in filing options can give the illusion of homogeneity. Respondents may "force" their internal data in to the given fields without adjusting them to agree with the field conceptual definitions or warning of their use of a non-standard definition. Use of the more disaggregated data will, as a minimum, allow those compiling industry data to warn users of the conceptual differences, if they are not reconcilable.

28. See, for example Statistics Canada, Transportation and Communications Division, Federal and Provincial Government Requirements for Transportation Statistics in Canada, 1982.